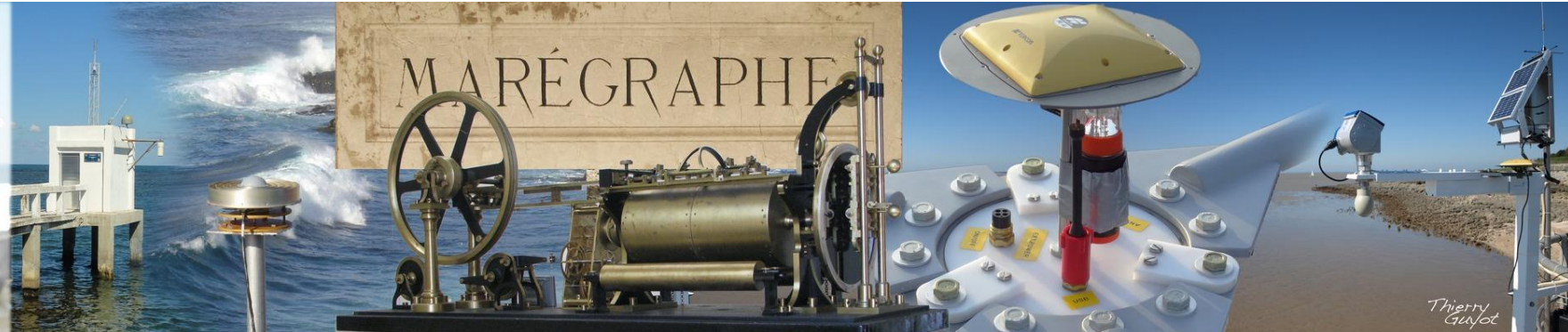


SONEL



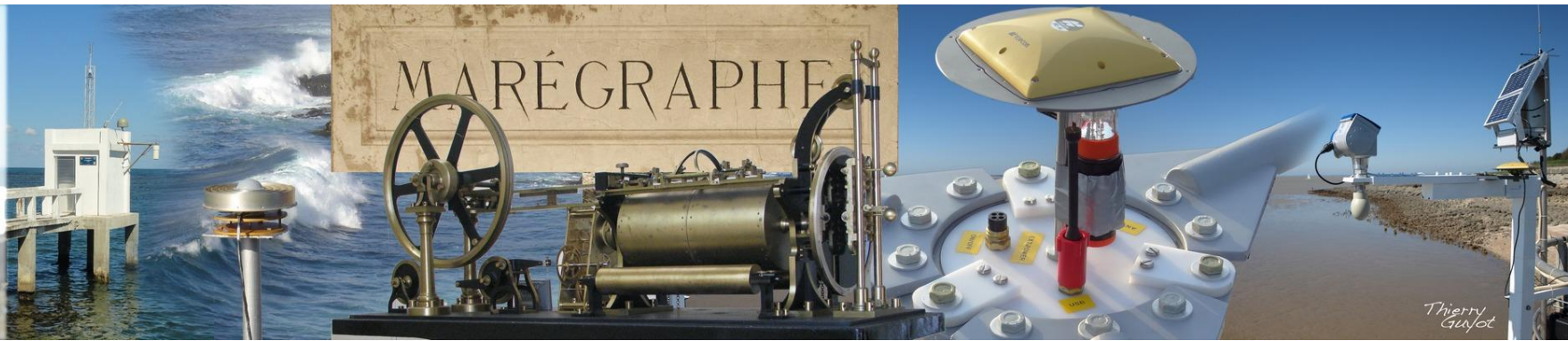
SONEL

Décrire et comprendre les variations du niveau de la mer (in situ)

2 observables : Le niveau marin et les mouvements de la croûte terrestre

2 instruments: La **marégraphie** et le **GPS**

SONEL



- 2001 : Proposition de créer un centre de données marégraphique (accord de l'IGN et du SHOM)
- 2003 : 1^{ères} obs. diffusées sur internet (2^{ème} pays en Europe)
- 2007 : 1^{er} Champ de vitesses GPS (utiles) aux marégraphes publiées
- 2010 : Demande du programme mondial GLOSS de la COI/Unesco
 - SONEl → GLOSS Data Assembly Center for GPS@TG
- 2011 :
 - Labellisation SO de l'INSU
 - Labellisation SOERE d'AllEnvi
 - Mesure phare du PNACC
- Adoption de SONEl par le groupe d'experts GLOSS (11 novembre)



SONEL : Un système de système



Convention de collaboration inter-organismes
Signée en juin 2014 entre **membres fondateurs**
CNRS / IGN / SHOM / ULR / UPS

Labels



International

Marégraphes



GNSS



IGS

National



PNACC



IGN

INSTITUT NATIONAL
DE L'INFORMATION
GÉOGRAPHIQUE
ET FORESTIÈRE

RGP

RENAG

DORIS

Depuis 2010 (instruction du premier ministre) :
Réfèrent national pour la marégraphie :

Système ouvert (conçu comme tel : accueillir d'autres réseaux marégraphes/GPS)

Objectif : Diffusion de données de la meilleure qualité

- Niveau de la mer
- Position et mouvement des stations GPS
- Rattachement

Ambition : Référent sur les questions de niveau marin

Plus value SONEL

- Centralisation de l'information pertinente
 - GPS, marégraphie, nivellement, métadonnée
- Regard critique sur les données
 - Niveau de la mer
 - Contrôle qualité des observations GPS (RINEX)
- Analyse & Produits
 - Centre d'analyse => cohérence des analyses !
 - Tendances du niveau marin (relatif & absolu)
 - Vitesses verticales/horizontales
 -

Place à la pratique ...



- [Home](#)
- [Presentation](#)
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- [Programmes \(GLOSS\)](#)
- [CGPS@TG](#)
- [Users](#)
- [Documentation](#)
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Station manager only

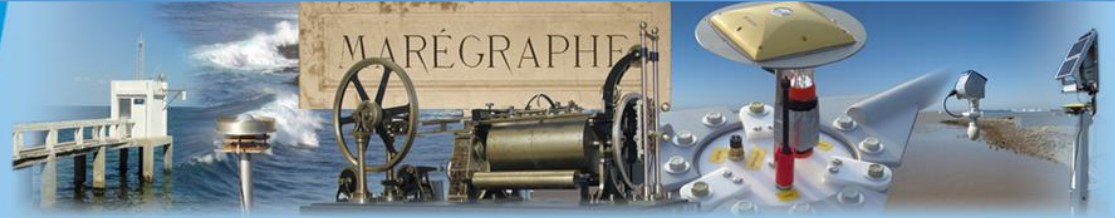
Login

.....

Connection

or ULR authentication


Search Ok



Welcome to SONEL

SONEL aims at providing high-quality continuous measurements of sea- and land levels at the coast from tide gauges (relative sea levels) and from modern geodetic techniques (vertical land motion and absolute sea levels) for studies on long-term sea level trends, but also the calibration of satellite altimeters, for instance.

SONEL serves as the GNSS data assembly centre for the Global Sea Level Observing System (GLOSS), which is developed under the auspices of the IOC/Unesco. It works closely with the PSMSL by developing an integrated global observing system, which is linking both the tide gauge and the GNSS databases for a comprehensive service to the scientific community. It also acts as the interface with the scientific community for the French tide gauge data.



News

International workshop : Marine submersions. Past, Present, Future. 19-21 June 2014 at the University of La Rochelle (4 June 2014)


GPS data downloaded out of the automatic data flow (Jan. 2013 to March 2014) (9 avril 2014)

Workshop at the Collège de France, Paris, 10-11 June 2013 (11 avril 2013)


[SEE PREVIOUS NEWS](#)

Observations


Tide gauges




GPS



Doris



Leveling



New station CGPS@TG

Help us to have the most complete and updated database



[SURVEY FORM](#)


Sea and land levels at the coast

SWITCH Relative (to the land) Absolute (geocentric)

As observed by a tide gauge -> Data from PSMSL, etc

>>> Corrected with nearby GPS >>> Data from PSMSL and SONEL

SEA LEVEL TRENDS



BAMFIELD (UCLU)

Combined velocity : 3.34 ± 0.42 mm/year
GPS velocity : 4.09 ± 0.3 mm/year
Tide gauge velocity : -0.75 mm/year
Selected period : 1978 >>> 2011

LAND MOVEMENTS



NOT1

NOTO

Value : -0.57 ± 0.2 mm/year
Time span : 10.3 years
Data completeness : 100 %
[More about NOT1 ...](#)





TIDE GAUGES

Home > Observations > Tide gauges



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Station manager only

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Search

Tide Gauges

Map | Which observations ? | How to access the tide gauge observations

OPTIONS 71 STATIONS ARE DISPLAYED ON THE MAP

SAINT-PIERRE-ET-MIQUELON (SPMIQ)
Longitude : -56.1683
Latitude : 46.7788
[More about SPMIQ ...](#)

2000 km / 1000 mi

Google

Terms of Use

- The station works properly : data are available
- Problem(s) detected but data are available
- The station doesn't work
- The station no longer exists
- The station is managed by a foreign partner

Display

- Available data / Station OK (68)
- Available data / Problem(s) detected (1)
- Does not work (1)
- No longer exists (1)
- Foreign partner management (620)

UPDATE

DEFAULT



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-
- Connection
- or ULR authentication
- Search Ok

SAINT-PIERRE-ET-MIQUELON

Home > Data > Tide Gauges > SAINT-PIERRE-ET-MIQUELON

Station summary

Responsible organization: [link to REFMAR web page](#)

Latitude : 46.77883333

Longitude : -56.16830556

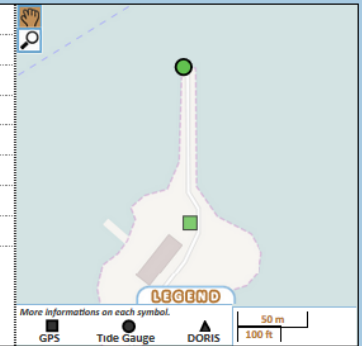
Start date:

End date:

Country: FRANCE

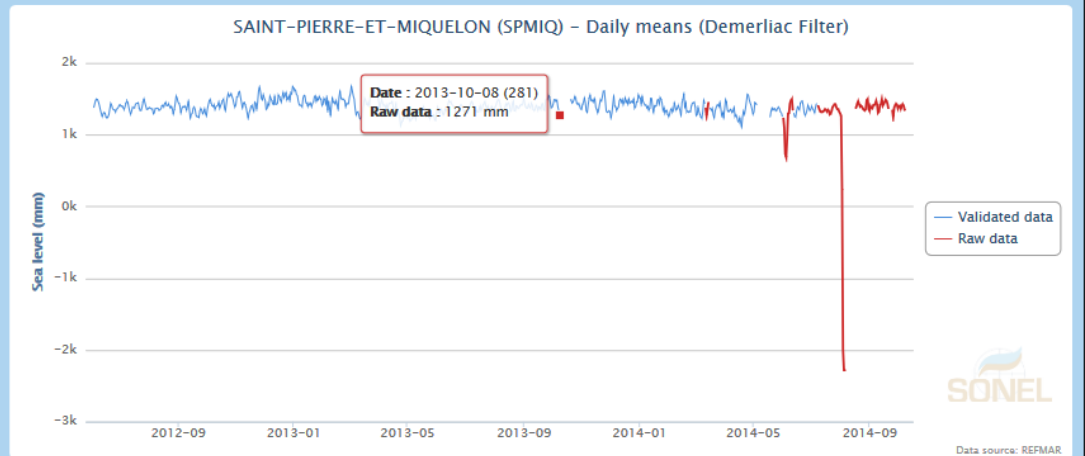
City: SAINT-PIERRE-ET-MIQUELON

Station state: VERT



Mean sea level

Demerliac



Daily means

Monthly means

Annual means

Calculating the mean sea levels

Date format [YYYY-MM-DD]

Download this validated data

Links to data sources

Link to high frequency data: <http://refmar.shom.fr/en/saint-pierre-et-miquelon>





SONEL

www.sonel.org

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SONEL

SAINT-PIERRE-ET-MIQUELON

Home > Data > GPS > Saint Pierre

On-site responsible agency - Manage this station STPM

Contact name : RGP Team
 E-mail : rgpadmin@ign.fr
 Agency : IGN - Institut Géographique National

Station summary STPM

IGS-type acronym :	STPM
Latitude :	46.77782379
Longitude :	56.16824438
Installed date :	2013 06 20
Decommissioned date :	
Country :	FRANCE
City :	SAINT-PIERRE-ET-MIQUELON
Station status :	active (green)
Distance to Tide Gauge (m) :	112
Domes number :	97501M004
IGS-like station form :	<input type="text" value="stpm_20140324.log (current)"/> <input type="button" value="View"/> <input type="button" value="Update"/>

Data available at SONEL STPM

First data : 2013-12-01 (2013-335) -- Latest data : 2014-10-08 (2014-281)

[Click on the timeline to display detailed calendar](#)

Quality plots on RINEX files STPM

Observations & tracking performance

Satellite tracking

PLOTS generated using software developed with the EPN team at ROB

Co-located instruments STPM

Tide gauge : [SAINT-PIERRE-ET-MIQUELON \(SPMIQ\)](#)

Leveling & Datums STPM

[Access to leveling data \(Benchmarks, Datums...\)](#)

Photo album STPM

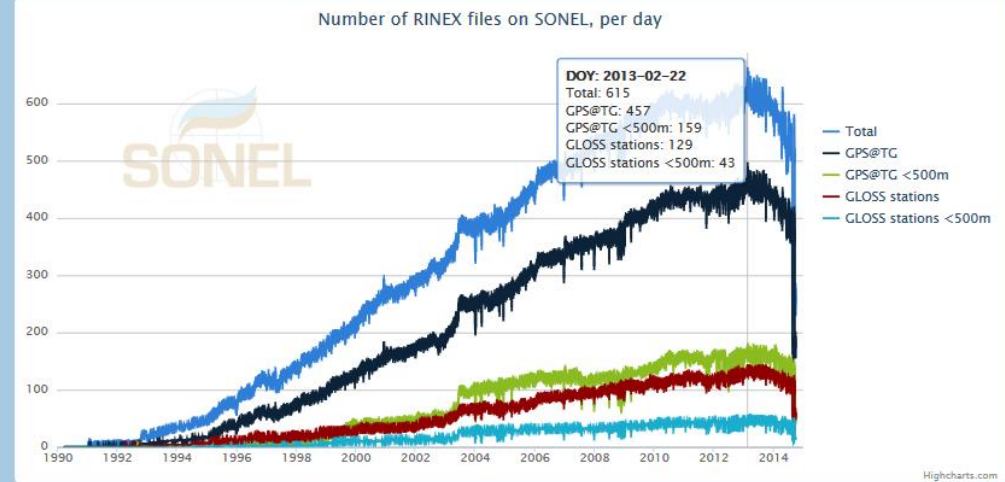


<p>Affichage</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Station active (421) <input checked="" type="checkbox"/> Aucune donnée depuis 30 jours (146) <input checked="" type="checkbox"/> Déclassé (89) <input checked="" type="checkbox"/> Aucune observation dans SONEL (100) <input type="checkbox"/> Toutes les données GPS disponibles (stations de référence incluses) 	<p>Centres de données</p> <ul style="list-style-type: none"> BAFG BIGF BKG (EPN, IGS) Canary GNSS Centre CDDIS (IGS) CEA CRS DGFI EJERCITO ENS Geologie 	<p>Programmes & Réseaux</p> <ul style="list-style-type: none"> AMMA COCOnet ESEAS EUREF GCOS GLOSS GLOSS ALT GLOSS LTT GNET IGb08 	<p>VALIDER</p> <p>DÉFAUT</p> <p>ANNULER</p>	
---	--	--	---	---

Which GPS stations?

Map What GPS data? How to get access to the GPS observations Which GPS solutions?

This graph shows the evolution of the number of Rinex files available on SONEL (per DOY) since 1991-079



The GPS observations that we provide are in the form of daily 30s files (24h of observations at 30s intervals) in the standard international RINEX format. Further information on the RINEX files.

Apart from the RINEX observation files of the GPS stations, SONEL provides ancillary information which enables a precise analysis of the GPS measurements, in particular :

- ▶ the precise orbits of IGS,
- ▶ the Earth orientation parameters of IGS.

Survey on Continuous GPS and Tide Gauge co-locations (CGPS@TG)

In order to get a better idea of the status and opportunities on continuous GPS positioning of tide gauges, a survey is carried out periodically within various geoscience communities. The survey aims to identify the existing permanent GPS stations which are close to tide gauges (up to approximately 10-15 km).



SURVEY FORM

- ▶ The survey results can be viewed in conjunction with SONEL data holdings on the map (above). Purple symbols correspond to stations for which there are no observations in SONEL yet.
- ▶ By clicking on the table icon an on-line updated view of the CGPS@TG information that has been supplied to us is displayed. The table can be sorted by clicking on the column items, and a version of the view (table) can be downloaded in a format compatible with applications like excel (.csv).
- ▶ A '.kmz' file provides a Google Earth view of the CGPS@TG geographical distribution. The `cgpstg.kmz` file is consistent with the above mentioned table (updated weekly). Clicking on a station symbol provides ancillary information on the station, and further clicking on the station name provides access to the so-called GPS sitelog (if the GPS data are available). The CGPS@TG '.kmz' view might be useful in conjunction with the '.kmz' files of satellite radar altimetry ground tracks provided by CLS, or with the '.kmz' file of tide gauge records provided by the PSMSL.

Survey results table



Survey results on .kmz file

- ▶ In addition to the periodic surveys, information on CGPS@TG co-locations can also be supplied to us any time by filling in this form. Thank you in advance for your collaboration.
- ▶ The sitelog generation tool can help you generate a sitelog file for your station, suitable with IGS requirements.

UK FR

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Station manager only

Login

.....

Connection

or ULR authentication

Search Ok



Visualisation du champ de vitesses verticales

Analysis center : ULR

Solution : ULR5 (Latest solution)

Solution(s)

Solution(s)

Latest solution :
ULR5

Past solution :
ULR4

Map About Statistics Download



Citation

► Please cite this paper if you find the results useful:

A. Santamaria-Gomez, M. Gravelle, X. Collilieux, M. Guichard, B. Martin Miguez, P. Tiphaneau, G. Wöppelmann (2012) : Mitigating the effects of vertical land motion in tide gauge records using a state-of-the-art GPS velocity field. *Global and Planetary Change*, Vol. 98-99, pp. 6-17.

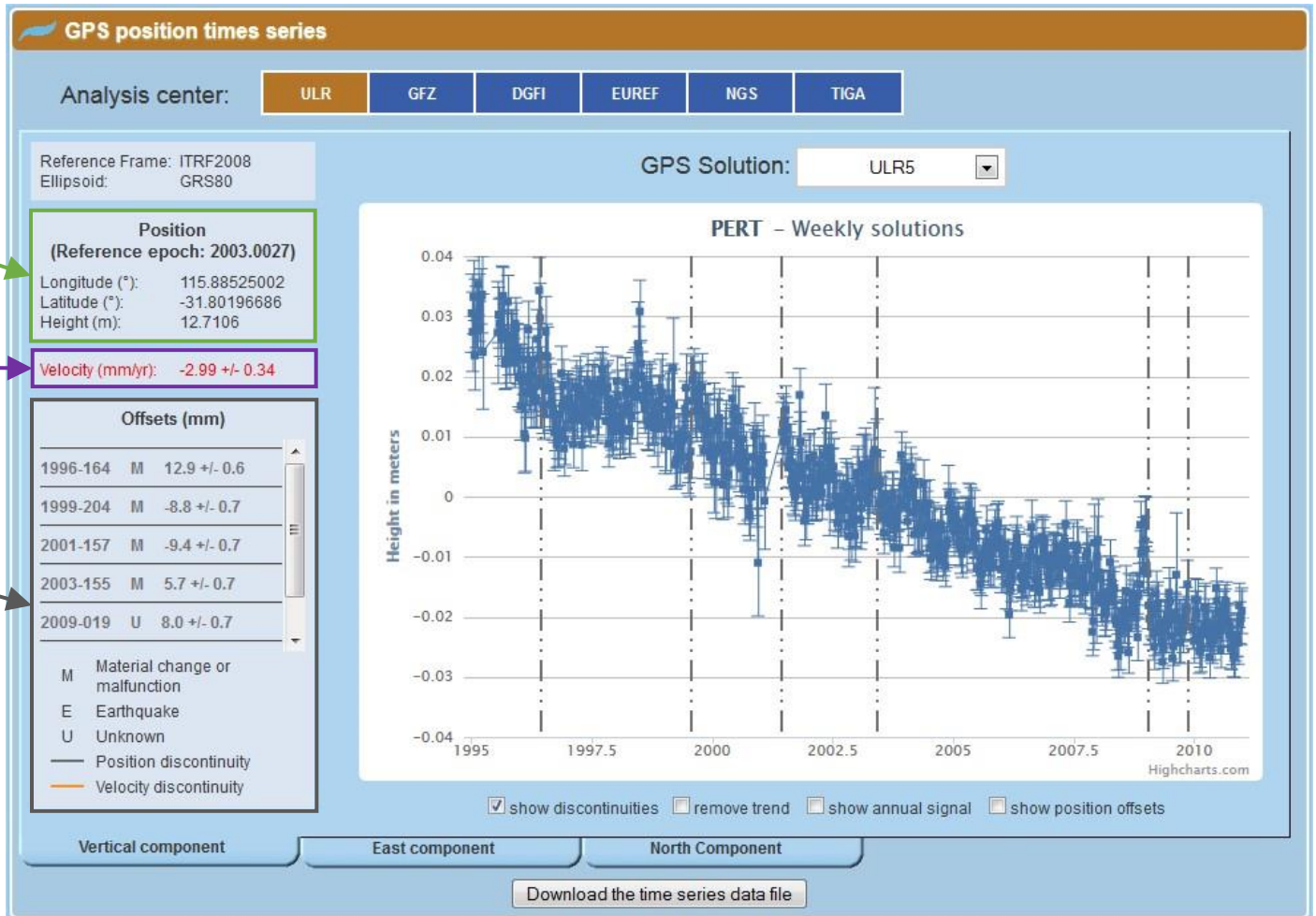


Carte du champ de vitesses verticales

Coordonnées

Vitesse estimée

Discontinuités



- **Par défaut:** affichage de la série avec la tendance et les dates de discontinuités
- **Options:** affichage du signal annuel et des offsets estimés, suppression de la tendance.

Tendances aux marégraphes

SWITCH

Relative (to the land)
As observed by a tide gauge
Data from PSM&L and SONEL

Absolute (geocentric)
Corrected with nearby GPS
Data from PSM&L and SONEL

SEA LEVEL TRENDS

BAMFIELD (UKLI)
Combined velocity: 3.34 ± 0.42 mm/year
GPS velocity: 4.09 ± 0.3 mm/year
Tide gauge velocity: -0.75 mm/year
Selected period: 1970 to 2011

Home Products (demonstrative) Sea level trends

SWITCH

Relative (to the land)

As observed by a tide gauge

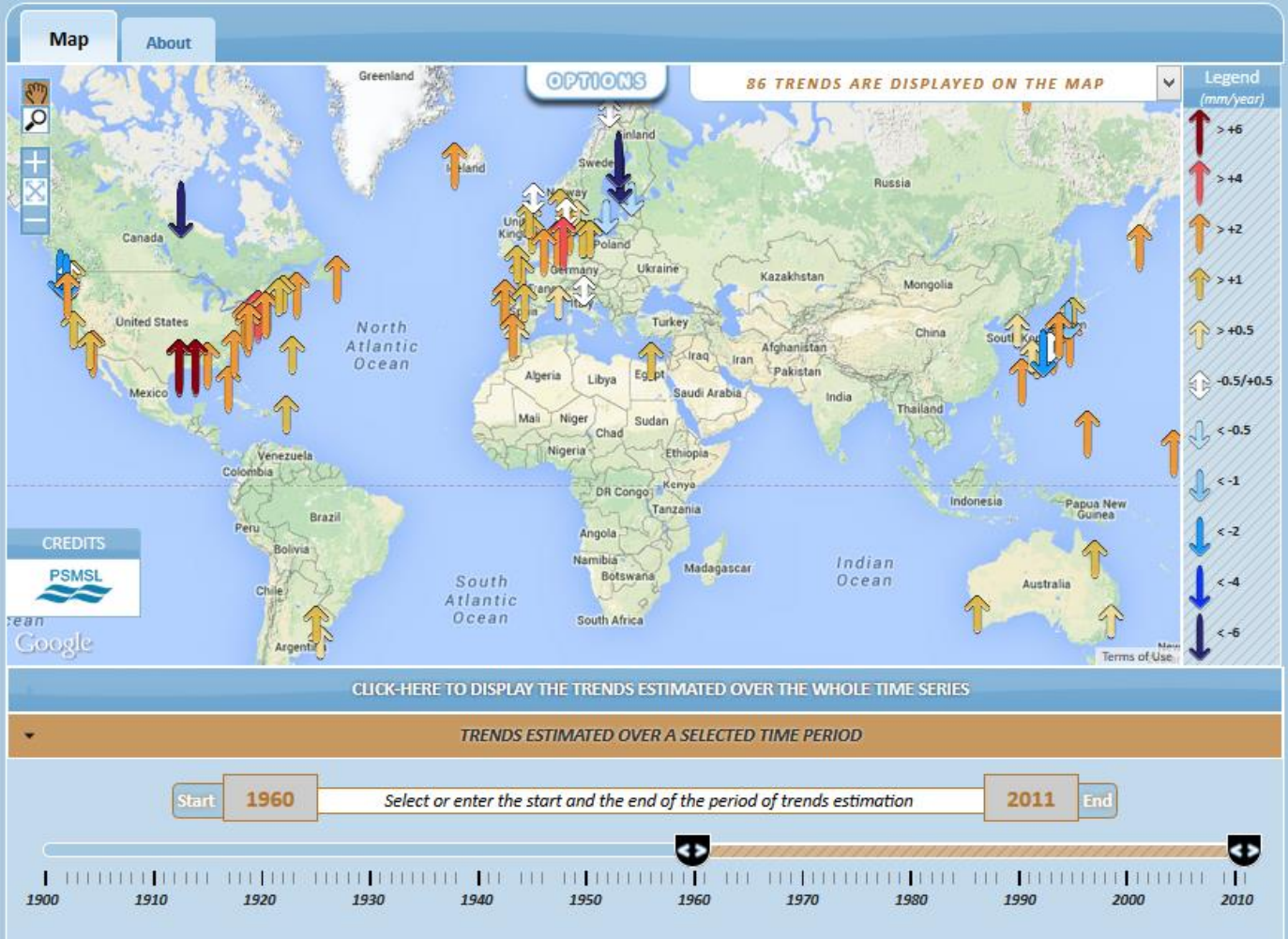
Data from PSM&L

Absolute (geocentric)

Corrected with nearby GPS

Data from PSM&L and SONEL

Relative Sea Level Trends



Tendances aux marégraphes

SWITCH

Relative (to the land)
As observed by a tide gauge

Absolute (geocentric)
Corrected with nearby GPS
Data from PSM&L and SONEL

SEA LEVEL TRENDS

BAMFIELD (UKLJ)
Combined velocity: 3.34 ± 0.42 mm/year
GPS velocity: 4.09 ± 0.3 mm/year
Tide gauge velocity: -0.75 mm/year
Selected period: 1970 vs 2011

Home Products (demonstrative) Sea level trends

SWITCH

Relative (to the land)

As observed by a tide gauge
Data from PSM&L

Absolute (geocentric)

Corrected with nearby GPS
Data from PSM&L and SONEL

Absolute Sea Level Trends

Map About



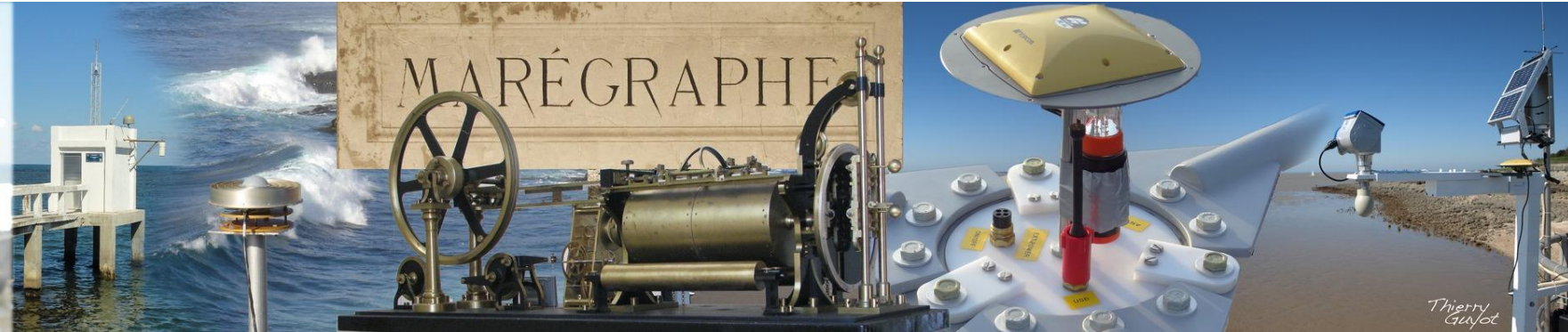
CLICK-HERE TO DISPLAY THE TRENDS ESTIMATED OVER THE WHOLE TIME SERIES

TRENDS ESTIMATED OVER A SELECTED TIME PERIOD

Start 1960 Select or enter the start and the end of the period of trends estimation 2011 End



EXPORT DATA



- **Une grandeur fondamentale** : Le niveau de la mer (in situ)
- **Un enjeu majeur** : Décrire et comprendre ses variations
- **Des partenaires** : CNRS, Universités, SHOM, IGN
- **Des moyens** :
 - Humains et financiers : ~ 6 ETP / 110 K€/an (2 millions d'€)
 - Informatiques : Centre de calculs (cluster de 512 nœuds) + Archivage (7 To)
 - **Nécessité de pérennisation des financements (pluriannuel)**
- **Des flux de données** :
 - Niveaux moyens pour les marégraphes Français (62 stations)
 - Déplacements verticaux pour plus de 250 stations GPS co-localisées dans le monde (~ 150 de plus dans la prochaine solution ULR6)
- **Des produits** :
 - Tendances aux marégraphes (PSMSL)
 - Mouvements verticaux et horizontaux
 - ...